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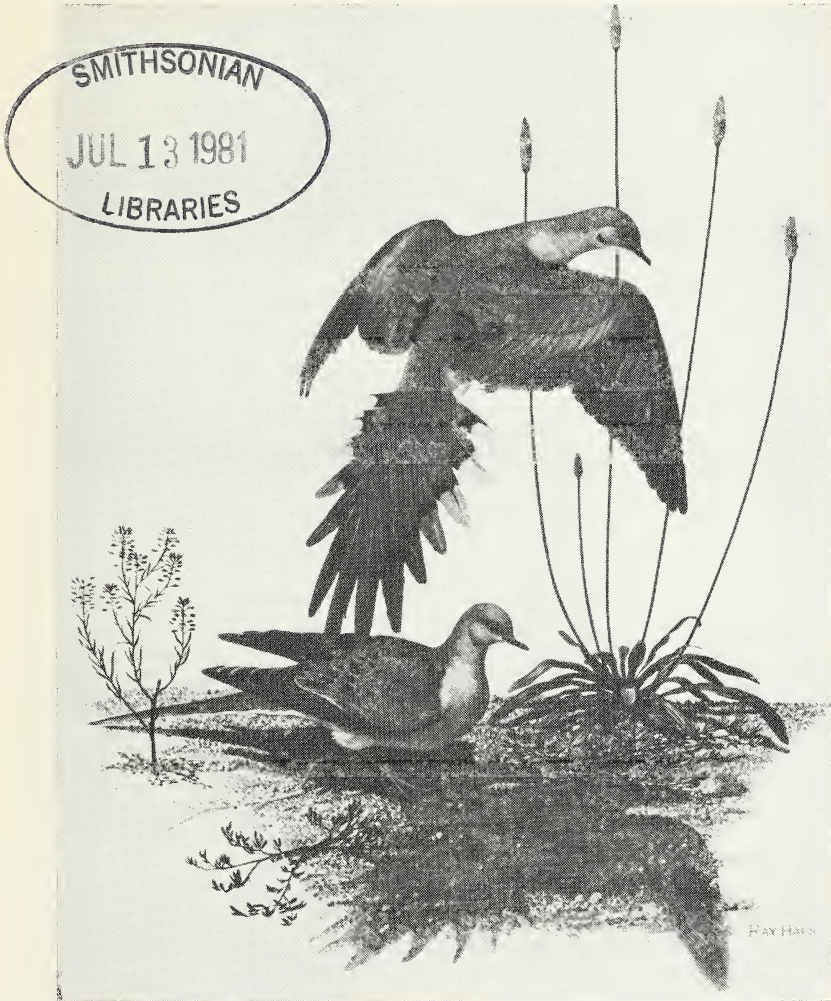
# Kentucky Warbler

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## OUR COVER

The Mourning Dove on the front cover is the work of Ray Harm, our staff artist.

## MOURNING DOVE NESTING STUDY

LEE K. NELSON, WILDLIFE BIOLOGIST

KENTUCKY DEPARTMENT OF FISH AND WILDLIFE RESOURCES

A Mourning Dove (*Zenaida macroura*) nesting study designed to determine the importance of late nesting to overall recruitment was initiated in early 1979. Twenty-three states and several universities agreed to conduct the study that was coordinated by the U. S. Fish and Wildlife Service (USFWS). This was a response to a legal challenge that September dove hunting was causing significant mortality among nestlings. The study was a two-pronged investigation. Objective I is the one described in this article. Object II ran for two years and was completed in the fall of 1979. Its purpose was to determine if September dove hunting was a significant factor in nestling mortality. That study determined that it was not. The Kentucky Department of Fish and Wildlife Resources participated in both studies.

The Objective I study was conducted during the 1979 and 1980 dove breeding seasons. It involved a thorough search for dove nests on two selected study areas on a weekly basis. Searches started the first week of February and ended the last week of October. Follow-up visits were made to each nest found and its fate determined. A mandatory visit on the 10th post-hatch day was prescribed. Nestlings present on that day were arbitrarily considered fledged. Continued observation of the nest was encouraged, but was not required. All participating states and agencies agreed to carry out the study according to a common plan so that the results would be uniformly obtained.

The searcher spent approximately six hours searching the study area on search day at the height of the nesting. Searches took less time in the off-peak periods. Careful searches were encouraged. In some cases individual trees were circled. Only "active" nests (i.e. nests containing eggs, nestlings, or a parent) were used. A mirror attached to an extendable pole was used in checking high nests. Each located nest was marked with a numbered plastic ribbon attached to a tree limb. In some cases, plastic ribbon was also wrapped around the base of the tree as an aid in locating the nest tree. Each nest was assigned a number. Data such as type of habitat, species of tree, height of nest above the ground, number of eggs and nestlings, presence or absence of parent, stage of incubation or brooding, fate of eggs or nestlings, date found, dates checked were recorded. Hatching and fledging dates were also recorded. If an individual nest was used a second or third time, or more, this information was recorded.

Precautions were taken to avoid undue disturbance of the nests. In some cases, observations at a distance were possible. In others it was necessary to flush the parent to determine the status of the nest. When nestlings were inadvertently flushed out of the nest, an attempt was made to catch them and place them back in the nest.

In cases where the nestling attempt was disrupted, every effort was made to determine the cause of the loss from the evidence available. This was not always possible.



Two study areas were searched each year. Study Area #1 used during the 1979 breeding season embodied 64 acres and was located on a non-hunted portion of the West Kentucky Wildlife Area in McCracken County. Only three nests were found there that year so a new study area was selected to replace it in 1980. This new study area included a 3.8-acre apple orchard on the Potter farm on the west edge of Paducah and 14.2 acres of Maple Lawn Cemetery in Paducah. The former area consisted of reverted farm land with clumps of woody vegetation scattered throughout. An electric power transmission line transected it. The latter area contained apple trees (*Malus pumila*) in the one section, and scattered red cedar (*Juniperus virginiana*) and other evergreens and a few deciduous trees in the other. Study Area #2 consisted of two parcels of the Frank Street farm in Henderson County. This area was used during both years of the study. A ten-acre parcel was made up entirely of peach trees (*Prunus persica*) in an orchard. An 11-acre parcel consisted of a peach orchard; two groves of Chinese chestnut (*Castanea mollissima*), pecan (*Carya peca*), and black walnut (*Juglans nigra*); a short strip of white pine (*Pinus strobus*) and loblolly pine (*Pinus taeda*); and a few other species. At the start of the study there were 792 trees searched on this study area. However, a number of dead, dying, and storm-damaged trees were removed as the study progressed.

During the 1979 breeding season there were 86 dove nests recorded from both study areas. Of this number, three were found at the McCracken County area and 83 at the Henderson County area. Forty-nine nests (57%) successfully fledged birds. A total of 165 eggs was laid, of which 91 hatched (55.2%). There were 84 birds fledged, which was 50.9% of the total eggs laid. There were nine one-egg nests, 75 two-egg nests, and 2 three-egg nests. Of the 37 disrupted nesting attempts, only three (with a total of four chicks) had nestlings at the time of destruction. The causes of destruction were listed as: unknown — 22, desertion — cause unknown — 6, predation — type unknown — 3, wind storm — 2, predation — avian — 1, desertion when cuckoo used the nest — 1, desertion when peach fell into nest — 1, and destroyed by tree pruning operation — 1. Fifty-two nests were located in peach trees, 24 in Chinese chestnut, five in white pine, two in pecan, and one each in red maple (*Acer rubrum*), willow (*Salix nigra*), and wild cherry (*Prunus serotina*). There were ten instances in which one nest was used twice and three instances in which one nest was used three times. There were three instances in which the same tree was used, but the nests were in different locations. In no case was an active dove nest found in a tree with an active nest of any other bird species.

In 1980 a total of 118 nests was recorded at the study areas. Seventy-four of these (62.7%) successfully fledged birds. The fate of two nests went undetermined. A total of 228 eggs was laid, of which 165 hatched (72.4%). There were 132 birds fledged this year, which was 57.9% of the total eggs laid. There were 39 nests found at the McCracken County area and 79 at the Henderson County site. There were nine one-egg nests, 108 two-egg nests, and one 3-egg nest. Nest failures were attributed to: unknown — 26, weather — 10, desertion — 2, and predation — type unknown — 4. Of the 42 failures, fifteen had a total of 25 nestling mortalities. Forty-two nests were found in peach trees, 28 in red cedar, 20 in Chinese chestnut, 10 in apple trees, nine in white pine, four in pecan, one in black wal-

nut, one in an English walnut (*Juglans hindsii*), one in a sour cherry (*Prunus cerasus*), one in a loblolly pine, and one in an osage orange (*Maclura pomifera*). There were eight instances in which one nest was used twice, four instances in which one nest was used three times, and one instance in which one nest was used four times in the same season. There were four instances in which the same tree was used, but the nests were in different locations. One tree had three nesting attempts and a total of two nests. One instance was recorded in which a nest built and used twice in 1979 was used again in 1980. Two active dove nests were observed in the same peach tree at the same time. This was the only instance where doubling up was known to occur in this study.

As pointed out earlier, Kentucky's participation in this dove nesting study was but one segment of the overall investigation. Our findings were submitted to the Study Coordinator of the USFWS where they are being compiled and analyzed in conjunction with those submitted by all other participating agencies. A final report embodying all of the data and a complete analysis of them will be issued by the U. S. Fish and Wildlife Service. It is of notable significance that a study like this was carried out. A common investigative plan was utilized over a large segment of the Mourning Dove range. Certainly our knowledge of this species' breeding habits will be greatly enhanced by it.

Kentucky's findings have added to the sum total of knowledge of local Mourning Doves. Detailed information was obtained on 204 nesting attempts spread over two breeding seasons. Some insight was gained of nesting activity at various periods of the breeding season, such as:

<i>Month</i>	<i>% of Nests Found</i>	<i>% of Birds Fledged</i>
March	5.9	—
April	14.7	3.2
May	12.8	13.4
June	21.1	19.9
July	19.1	24.1
August	22.5	18.1
September	3.4	19.0
October	.5	2.3

It confirmed a rule of thumb that in a normal year one can expect that around half of the number of eggs laid will result in fledged birds. In this case it was 55%. It showed, too, that most of the nest failures occurred during the egg stage (77.2%). Nesting attempts disrupted in the nestling stage occurred in 22.8% of the cases. Nesting losses were fairly uniform over the breeding season:

<i>Period</i>	<i>% of Nests Found</i>	<i>% of Nests Lost</i>
March-April	20.6	19.0
May-June	33.8	32.9
July-August	41.7	38.0
September-October	3.9	10.1

Unfortunately, it was not possible to gather adequate data on the causes of nest losses. Over 60% were listed as unknown. Twelve losses were attributed to weather. Winds up to 80 mph on July 2, 1980 destroyed four nests on the Henderson County area. Amazingly, six other active nests survived this storm. One of the latter, which was five feet up in a chestnut tree, was blown to the ground underneath the tree. The nestlings were six and seven days old at the time of the mishap. However, the two nestlings and the adult were observed in the nest in the new location on July 4th and 5th. One nestling was still in the nest on July 7th. Both were considered to have fledged.

In another interesting incident a nest with two dove eggs was found in a chestnut tree at the Henderson area on August 6, 1979. On August 13 (the next search day) the two eggs were still present and the adult was absent. On August 20th the nest had four eggs, which included the two original dove eggs plus two Yellow-billed Cuckoo (*Coccyzus americanus*) eggs. The Yellow-billed Cuckoo was flushed from the nest that day. It was assumed that the cuckoo took over the dove nest. It was not known, however, if the cuckoo drove the dove off, or if it just decided to lay in an abandoned nest that it came across.

It is generally known that doves prefer to nest in certain favored spots, i.e. orchards, cemeteries, pine borders and windbreaks. This fact was certainly brought home in the sister phase of this study (Objective II) where search areas were picked at random. Most fruit trees have a branching system that is apparently attractive to the dove. The height of the trees and the spacing in the orchard are certainly factors also. The open ground under the trees is probably an influence too. The peach trees in the front orchard of the Henderson area were 14 years of age in 1979. Those in the back orchard were eight years old. Almost four times as many nests were found in the older trees. The location of the orchard was not the important factor since an earlier dove nesting study conducted in 1968-69 in older trees in the back orchard (prior to their clearing and starting over with new trees in 1971) revealed high dove usage for nesting. Chinese chestnut and red cedar were popular species for dove nesting with 44 and 28, respectively, found in them.

It was conservatively estimated that even with careful searching approximately 10% of the total nests present were not found and recorded.

Wildlife Biologists Mike Henshaw, Robert Morton, Ben Burnley, and Area Manager Larry Sharp all participated in this study and all had an important role in data collection. The data were recorded on Cornell Nest Cards. — Rt. 3, Owensboro, Kentucky 42301.

## THE WINTER SEASON OF 1980-81

ANNE L. STAMM

The winter season was very mild with little snowfall and higher temperatures than normal. It was very dry throughout the state. The transient lakes south of Bowling Green were dry, as were some of the sloughs at Henderson. At Louisville it was the driest January since the National Weather Service began keeping records in 1873. Some light snow fell in late December, early January and again the latter part of the month, with up to six and eight inches in various parts of the state.

The season was rather dull and uneventful for most birders. Ducks and geese were slow in coming south. Feeder watchers complained because of the scarcity of birds as compared to previous years; and normal wintering species were in low numbers in some sections. However, there were three species which appeared at some feeders causing great excitement: Northern (Baltimore) Oriole, Lesser Goldfinch, and House Finch. A few other species added some interest to the season: Red-necked Grebe, Old Squaw, White-winged Scoter, Surf Scoter, Bald Eagle, Golden Eagle, White-winged Crossbill and Snow Bunting.

Waterfowl began moving north in late February, woodcock and snipe made their appearance from the south, cowbirds and grackles began to show up in numbers where they had been more or less absent during January and early February. Yet, at the end of the period little spring migration was evident.

*Loons through Herons* — As usual, most of the Common Loons departed before the Christmas Bird Count period began; however, some remained until mid-January in eastern Kentucky, with a count of 12 at Clay Hill Boat Ramp Area, Rowan County on January 9 (FB) and eight on the same date at Cave Run Lake-Twin Knobs and two there on February 23 (FB); two at Dale Hollow State Park, January 25 (JEl) and one at Wolf Creek Dam, January 11 (JEl). A Red-necked Grebe, near Towhead Island, Louisville, January 16, found by Brainerd Palmer-Ball, Jr., was seen again on January 17 (AB) and 18 (JEl, m. ob.). A few Horned Grebe lingered until January and February: four were at Louisville, January 3 (LR); and singles at Kentucky Lake, February 8 (JEr) and at Mayfair Basins, mid-February (JK). A Western Grebe was reported at Barren River Reservoir for three weeks in January (*fide* HS). Great Blue Heron were found in good numbers and were widespread. A Green Heron at Louisville on February 7 was unusually early; it was heard and seen (AB).

*Waterfowl* — Canada Geese were fairly widespread all across the state. However, the population did not reach its peak until the first week of February at Ballard Waterfowl Management Area (hereafter BWMA), and then they began to leave by the end of the month: some 20,000 were there on December 2, with 35,000 on January 5, and 60,000 on February 2, and 100,000 on February 9 (TY); departure dates there were noted in



late February, with only 15,000 on February 25 (TY). This trend was the same in the area from Barkley Lake dam to Highway 68, with 1,825 Canada Geese on February 3 and only 530 there on February 20 (VA). Northward migration was also noted on February 21 when an estimated 3,000 were seen flying over Kentucky Lake at Hamlin (JEr). Farther eastward, the Canada Goose was "exceptionally common" near Danville, with at least 600 on two occasions in January at Dix Dam (FL), and also a 'pint-sized' *hutchinsii*, December 20 (FL). Also, interesting for the inner Bluegrass Area was a "couple hundred Canada Geese" on the power plant cooling ponds, south of Burgin, January 25 (DC). Snow Geese were primarily in western Kentucky, with 4,500 at BWMA, December 2; they peaked with 8,000, February 2 (TY); and 6,000 were still there at the end of the period (TY); singles were reported at Danville and Frankfort. In most sections ducks arrived later than normal. Ducks at BWMA peaked on December 15, with a total of 50,000, but by February 23 only 1,000 were there (TY). Mallards were the dominant species at Barkley Lake, with a total of 8,000 on January 5 (VA), and the high count of Black Ducks there was 900 on February 3 (VA). At Louisville, ducks were in low numbers, although Mallards were present in fair numbers during December at Cave Hill cemetery. Farther east, at Danville, the maximum number of Mallards was 2,500 (FL); an estimated 1,000 were seen south of Burgin, January 25 (DC); and a raft of 1,500, mostly Mallards and Blacks, at Waitsboro Recreational Area, near Burnside on Lake Cumberland, January 3 and between 600 and 700 there the following day, but practically all had left by January 6 (JEl). It would be impossible to mention all the ducks reported, but a few noteworthy observations follows. Three hundred Canvasbacks were seen near Donaldson Creek area in Trigg County, January 5 (VA); twenty-four at Louisville, February 4 (LR); five south of Burgin, January 25 (DC). Nine Greater Scaup were in the Ohio River basin, Louisville, December 19 (LR); four upstream, January 4 (AB). Lesser Scaup were in low numbers in the Louisville area and numbers elsewhere were not spectacular. There were some fair counts of other diving ducks, such as the 300 Common Goldeneye, January 5, on upper Barkley Lake and 500 there on January 23, while 250 Bufflehead were on Barkley Lake from the dam to the Tennessee line, January 5 (VA). An Oldsquaw at Energy Lake in Land Between the Lakes, January 22, was of interest (JEr). A few White-winged Scoters occurred in the Louisville area: one at Towhead Island, January 13 (DP); one there January 17, possibly the same bird (AB, JEl); three at Falls of the Ohio, February 7 (AB) and two remained through the end of the period (AB).

Raptors — An adult Goshawk was perched in full view at West Point, January 10 and was a pleasant surprise (S, FS); also, an adult at Jeffersonton, January 11 (CL). Single Cooper's Hawks were reported from various locations. Red-tailed Hawks were in good numbers all across the state, but particularly in southwestern Kentucky: eleven in two hours in Fulton County, January 10 (BS); on one occasion 22 were perched around a blackbird roost (CP). The Red-shouldered Hawk continued to be scarce, but was up slightly. Rough-legged Hawks were probably "scarcer than normal" at Danville (FL), but numbers were about the same in the central part of the state; one near Grayson Lake, January 18 (WG). There were two records of Golden Eagles (not including those on the FWS and KOS survey, or on the CBC): the most eastern record was of an immature bird



at Twin-Knobs Recreational Area and later near Alfrey Boat Ramp, Cave Run Lake, January 9 — documented (FB, Lewis Kornman, et al); and one along the West Kentucky Turnpike in Ohio County, February 20, also documented (KC, D. Garst). This was a good year for seeing Bald Eagles. Some interesting records were from the Cave Run Lake Area: an adult Bald Eagle, December 30 (AS); an immature, January 9 (FB, et al); one below the dam on the Licking River, February 24-25 (AS); and two at Minor Fish Hatchery, February 26 (FB, AS). The FWS & KOS Bald Eagle survey in January totaled 109 (m. ob.). Marsh Hawks showed some increase and were reported from 14 localities. The American Kestrel was common this winter and showed a 40% increase over last year on the CBC's.

*Bobwhite through Gulls* — Bobwhite were up slightly; 12 birds fed at a ground feeder at Bowling Green (WM). A single Sandhill Crane at Louisville, December 22 was a late straggler (VR). American Woodcock began arriving in mid-February; courtship flights noticed at Eubanks, February 17 (JEl) and at Fort Wright, February 21 (EG). A few Least Sandpipers lingered longer than usual at the Frankfort Avenue Reservoir, Louisville: four on December 3 (LR); and two remained until January 6 (AB). Gulls were in low numbers in most areas; 350 Ring-billed were seen at Devil's Elbow, LBL, February 21 (S, FS). The only exceptional count was an estimated 2,000 Ring-billed Gulls, with possibly a few Herring Gulls, flying high over LBL in early February (ER).

*Mourning Doves through Woodpeckers* — Mourning Doves were well distributed and were present in good numbers. Only one Snowy Owl was reported: one perched on top of a General Electric Building, Louisville, February 13 (DP). Yellow-bellied Sapsuckers were fairly well distributed and up slightly over last year (m. ob.).

*Horned Larks through Wrens* — Although Horned Larks were absent in some areas, they were "up" at Danville (FL); numbers were low in northeast Jefferson County in December, but increased in January when 300-500 were recorded on January 18 (LaS). Two small Common Crow roosts were reported in Calloway County: one near Hamlin and one near Hazel, with 150-200 birds in each (JEr). Red-breasted Nuthatches were present at various locations (m. ob.); last year the species was almost non-existent. No Winter Wrens were seen at Hamlin (JEr); however, they were present in various locations, but numbers were not as high as in earlier years. Most observers reported some increase in the Carolina Wren, but they were still scarce and in low numbers compared to the years prior to the severe winters.

*Mimids through Thrushes* — At Fort Wright the Mockingbird remained in numbers, but in some areas there was a slight increase over last year. The Brown Thrasher was a "common winter resident" at Hamlin (JEr) and a good number were present in late December all across the state; one came to a feeding station from January 9 until February 2 at Eubanks (JEl). Robins wintered in smaller numbers than last year, perhaps due to a shortage of food. (The dry season had some effect on fruit-bearing

shrubs and trees.) Although the Eastern Bluebird continued to be scarce, there were some signs for encouragement.

*Kinglets through Sparrows* — Both kinglet species, hard hit by the recent severe winters, remained in low numbers but had improved slightly over last year. A few Water Pipits were seen on the rocks at the Falls of the Ohio, December 31 (S, BM). The House Sparrow was thought to be increasing in Murray, where 400 were counted in one tree (CP).

*Blackbirds through Finches* — There were conflicting reports on the Eastern Meadowlark, but while numbers may have increased some they were not up to normal levels. There was considerable excitement when a Northern (Baltimore) Oriole appeared at a feeding station in Valley Station, December 28 to January 5 (JoB, DS). A male and female Brewer's Blackbird at Danville, December 20, was an interesting find (FL). Six blackbird roosts were reported: one at Murray of 300,000 birds, with 75% Common Grackles (CP); one at Somerset with an estimated one to two million birds, with mostly Common Grackles and Starlings (JEL); and four in southern Warren County, south of Bowling Green, with 4,000,000 birds, mainly Common Grackles, Red-winged Blackbirds, and Starlings (HS, RO). Common Grackles were scarce in the early part of the winter at Louisville (S) and especially at Danville (FL), but they began coming from the south in late January at Louisville and around February 21 at Fort Wright (EG). A few Evening Grosbeaks were present in widely scattered locations; some were singles at feeders, with no flocks greater than 25 to 30 birds and ranged from Madisonville (JH) to Rock Ford (FB), Carter Caves (JT), Sandy Hook (WG), and Jackson (PA) in the eastern part of the state and down to the Tennessee line at Cumberland Gap in southeastern Kentucky (BH). Purple Finches were widespread and in good numbers, with the highest count of 200 birds at the feeders at Eubanks, February 2 (JEL); numbers tapered off when the warm weather arrived, and only 70 were present on February 19 (JEL). House Finches have now spread from the eastern sections to the central part of the state, and the population increased drastically at Eubanks and at Somerset, with a high count of 180+ birds at the former city and 175 at the latter (JEL); one at a feeding station at the edge of Seneca Park, January 26 (SC) and four in east Louisville in mid-February ( *vide* BM). Pine Siskins were fairly common in some areas during January and February and ranged from Calloway County (JEr) in the western part of the state to Boone County (LM) in the northern section and Elliott County (WG) in eastern Kentucky, with a high count of 200 at Falls of Rough area (KC) in Grayson County. American Goldfinch were widespread and in 'good numbers' at Hamlin (JEr) and "more numerous than usual" at Murray (CP), and common at many Louisville feeding stations (AM, LSa, m. ob.). The bird of the season was indeed the Black-backed form of the Lesser Goldfinch at Elizabethtown, December 5-7! The bird was first sighted by Mary Jo Jones and confirmed by Jon Rickert, and later by Burt L. Monroe, Jr.; a new state record. There were two reports of White-winged Crossbill: six at Bedford (no date) by Thane Robinson (*vide* BM); and 12 at Lexington, January 24 (DC). There was a report of one Vesper Sparrow at Danville, December 20 (FL) and a flock of 25 at Hazel, February 4 (JEr). Dark-eyed Juncos (Slate-colored) were widespread and were found in great

numbers at Murray (CP), Fort Wright (EG), Mt. Vernon (AR), Morehead (FB). Tree Sparrows were in low numbers, but thought to be "common" at Big Bone State Park (LM). Field Sparrows were non-existent at Springfield (JB) and at Burlington (LM), otherwise fairly widespread but in modest numbers. White-crowned Sparrows were "hard to find" at Danville (FL) and in some sections of Louisville (S) and at Murray (CP). Two Lapland Longspurs were reported on January 17, north of Worthington (DP); a few in the same area the following day (LaS, BBC). The Snow Buntings were reported from only Louisville: three birds in the field with the longspurs, mentioned above, January 17 (DP) and about 30 birds on January 18 on a BBC field trip (LaS, BBC).

*Correction* — The eight Mississippi Kites and the Dickcissels, erroneously reported for Hickman County (*Ky. Warbler*, 56:70 and 82, 1981), were actually seen in Fulton County. Also, the one Turkey listed for Fulton County (*Ky. Warbler*, 56:70, 1981), was in Lake County, Tennessee.

*Contributors* — Special thanks are due the following persons, who were responsible for submitting specific notes for this winter report: Pierre Allaire (PA), Vernon Anderson (VA), Alan Barron (AB), John Barber (JB), John Boyer (JoB), Fred Busroe (FB), Kathryn Clay (KC), Susanne Clausus (SC), Dennis Coskren (DC), Jackie Elmore (JEL), Joe Tom Erwin (JEr), Helen Fisher, William Greene, Jr. (WG), Ed Groneman (EG), James Hancock, Janice Heckman, Barry Howard (BH), John Krull (JK), Frederick Loetscher, Jr. (FL), Charles Lovett (CL), Lee McNeely (LM), Alice Marion (AM), William Mathes (WM), Mike Miller, Burt L. Monroe, Jr., (BM), Robert Oddo (RO), Donald Parker (DP), Clell Peterson (CP), Anne Ramsay (AR), Lene Rauth (LR), Ed Ray, (ER), Jon Rickert (JR), Virginia Rommel (VR), Judy Robertson, Herbert E. Shadowen (HS), Linda Salmon (LSa), Lawrence D. Smith LaS), Betty Sumara (BS), Donald Summerfield (DS), Albert Surmont (AS), Anne L. Stamm (S), Frederick W. Stamm (FS), Russell Starr (RS), John Tirney (JT), Tom Young (TY).

*Other abbreviations:* Christmas Bird Counts (CBC), Fish & Wildlife Resources (FWS), Kentucky Ornithological Society (KOS), Land Between the Lakes (LBL), Beckham Bird Club (BBC), and Many Observers (m.ob.).

Any comments for the Spring Migration (March, April, and May) should reach the writer by June 7, 1981. — 9101 Spokane Way, Louisville 40222.



## SOUND STRUCTURE AND FUNCTION IN THE VOCALIZATIONS OF THE WHITE-BREASTED NUTHATCH

GARY RITCHISON

The use of sounds for communication is probably universal among birds and mammals. But the sounds generally associated with these groups are quite different. Whereas the songs and calls of birds are usually considered aesthetically pleasing, the vocalizations of mammals are thought of as harsh and generally less pleasing to the ear. This being the case, it is perhaps surprising that the vocalizations of birds and mammals follow many of the same "rules". Simply stated, both birds and mammals use harsh, relatively low-frequency sounds in hostile encounters and higher-frequency, more pure tonelike sounds when frightened, appeasing, or approaching in a friendly manner. In other words, there appears to be a general relationship between the physical structure of sounds and the motivation underlying their use.

A detailed examination of bird and mammal vocalizations suggests even more specific relationships between sound structure and function (Morton, 1977). These relationships may be summarized as follows:

1. Harsh, low-frequency sounds indicate that a caller is likely to attack if another individual comes closer or remains at the same distance.
2. Relatively tonal, high-frequency sounds indicate that the caller is submissive or will not be hostile if approached.
3. Sounds rising in frequency indicate a lower hostility or increasing appeasement of fears, Sounds decreasing in frequency indicate an increasing hostile motivation.
4. A sound whose frequency rises and falls more or less equally reflects a conflict of motivation to approach or withdraw from a stimulus.
5. A species that is generally more aggressive to conspecifics will tend to have a harsher close contact vocal repertoire than a species that often joins or is joined in flocks.

The main objective of the present study is to examine the relationship between sound structure and function in the vocalizations of the White-breasted Nuthatch, *Sitta carolinensis*.

Recordings and observations of White-breasted nuthatches were made from 1 October 1973 to 1 May 1975 at Elysian, Le Sueur County, Minnesota. Birds were banded with various colored-plastic band combinations to aid in individual recognition.

Vocalizations were recorded at 7½ ips on a Nagra IV or a Uher 4000 Report-L tape recorder using an 18½-inch diameter parabolic reflector. Recorded vocalizations were analyzed on a Kay Electric Company Sonagraph (Model 6061B).

Examination of the proposed functions of the various nuthatch vocalizations (Table 1) reveals a definite correspondence between the "predicted"

structure and the actual sonograph (Figure 1). Each of the close-contact calls can be placed into one or more of the previously listed categories. One vocalization, i.e., the "growl" call (Figure 1h), fits into the first category. Nuthatches uttered this call in two situations. Interspecifically, it was given when another bird (usually Black-capped chickades) came too close to a nuthatch at a bird feeder. This call was also given in test situations when a nuthatch model (study skin) was placed within a bird's territory and nuthatch songs were then played back over a loudspeaker. In this latter situation males frequently approached to within several inches of

Table 1. Synopsis of the vocalizations of the White-breasted nuthatch

Vocalization	Function
Hit-tuck*	location; maintain pair-bond
Tchup*	mild excitement; location
Quank*	location
Chrr	induce feeding by male
Phee-oo	solicitation
Growl	agonistic
Song*	territorial
Adult distress call*	"surprise" predator
Juvenile begging call	induce feeding by adults
Juvenile distress call*	"surprise" predator

\*Long distance vocalization (not subject to structure-function rules)

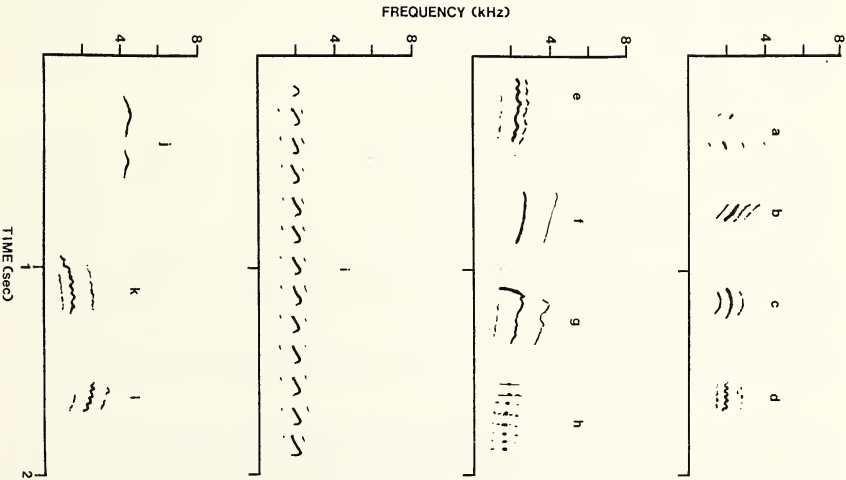


Figure 1. Physical structure (sonographs) of the vocalizations of the White-breasted nuthatch. a, hit-tuck; b, tchup; c, quank; d, rough quank; e, chrr; f, phree-oo; g, adult distress call; h, growl; i, song; j, juvenile begging call (4 days old); k, juvenile begging call (14 days old); l, juvenile distress call

the model and gave the "growl" call. Then, as predicted, males invariably attacked the model.

At the other extreme are vocalizations in the second category, i.e. tonal, high-frequency sounds indicating submission. A nuthatch vocalization in this category is that given by both males and females just prior to copulation (the "phee-oo" call; Figure 1f). This situation certainly requires an indication of submission or friendliness. Not surprisingly, this call exhibited one of the highest frequencies of any adult vocalization.

Another vocalization fitting into the second category is the begging call of young nuthatches (Figure 1j). Again, this situation (soliciting food from an adult) requires a submissive posture. This submission is accentuated by the fact that this call frequently shows a slight increase in frequency (category 3).

Vocalizations in the fourth category, indicating a conflict of motivation, are also found in the nuthatch's vocal repertoire. One such call is the "rough" quank call (Figure 1d). Quank calls usually functioned as long distance location calls; however, the "rough" variation was used when males with adjacent territories approached the resident's territory. Such a situation presents a bird with conflicting motivations. On the one hand there is the tendency to withdraw from near the neighbor's territory while, on the other hand, there is the urge to attack the potentially intruding male. This internal conflict is reflected by the alternating rise and fall in frequency of the "rough" quank call.

Other nuthatch vocalizations illustrating an apparent internal conflict are the "chrr" call (Figure 1e) of the adult female and the begging call (Figure 1k) of recently fledged juveniles. Each of these calls is utilized in situations that require an individual to approach an adult nuthatch, creating the conflicting tendencies to approach (and perhaps be fed) or to flee.

Finally, it is suggested that solitary species (those that do not form conspecific or mixed species flocks) will tend to have a harsher close contact vocal repertoire (category 5). The White-breasted Nuthatch clearly illustrates this point. Nuthatches generally remain paired throughout the year and, hence, do not join in flocks (either conspecific or heterospecific). As would be predicted, therefore, nuthatches have (especially for such a small bird) a vocal repertoire consisting almost entirely of low frequency calls. Other species of similar size, or even larger, generally have higher frequency vocalizations (e.g., the Boreal Chickadee (McLaren, 1976), the Lazuli Bunting (Thompson, 1976), the Carolina Chickadee (Smith, 1972), the Whimbrel (Skeel, 1978), and the Long-billed Curlew (Forsythe, 1970)).

Given this apparent relationship between call structure and function, what is its significance? Morton (1977) hypothesizes that low-frequency sounds will be favored in hostile encounters because of the relationship between low frequency and the size of the animal producing it. That is, the larger the animal the lower the sound frequency it can produce.

The fact that a larger animal will usually win in a fight against a smaller one has had an enormous selective effect on organisms, i.e., fighting with other individuals generates selection pressure favoring increasing size



(Johnston, et al, 1972). However, body size must also be kept within energetic boundaries. Therefore, selection has apparently favored a balanced system in which communication has replaced size as the main (but certainly not the only) determinant of which individual obtains a given resource. This has led to the evolution of a system in which low, harsh sounds are adaptive in hostile contexts. The result and selective value of using communication over fighting is that size will be more in balance with energetic requirements (i.e., the communicating population will be more likely to survive environmental stress than the fighting population). In a similar fashion, visual communication also relies on apparent size in sending messages (e.), piloerection to increase apparent size in aggressive encounters and vice versa). The same reasoning applies, in reverse, to tonal, high-frequency sounds.

In summary, whereas previous studies have often emphasized the distinctiveness of species vocal signals, it appears that the vocalizations of many birds and mammals have been similarly influenced by selective forces favoring the use of low, harsh sounds in hostile contexts and high, tonal sounds in friendly encounters. Recognition of this concept should greatly increase our understanding of vocal communication in birds and mammals.

I would like to thank Dr. Merrill Frydendall for advice and encouragement throughout this study. I would also like to thank Steven and Daryl Ritchison for assistance in the field.

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## THE KENTUCKY ORNITHOLOGICAL SOCIETY

### Spring Meeting April 24-26, 1981

The fifty-eighth annual Spring Meeting of the Kentucky Ornithological Society was held at Barren River State Resort Park on April 24, 25, and 26th, 1981.

The Friday night meeting was called to order by the president, Ramon Iles who introduced Pierre Allaire, the vice-president and program chairman. Dr. Allaire introduced Fred Busroe, who gave a slide presentation of a study of the changing avifauna on the Crosswaithe Outdoor Center and adjacent property affected in recent years by the impoundment of the Cave Run Reservoir. Blaine Ferrell presented an update on blackbird population and information that could lead to possible techniques for roost dispersal entitled: Effect of timed light and noise treatments on testicular development in Starlings in winter. The third speaker, Jon Rickert, reported the occurrence of the Lesser Goldfinch in Elizabethtown, Ky. on Dec. 4-7, 1980. Mr. Rickert presented slides of the unusual sighting which were taken by Dr. Herbert Clay, Jr. Mr. Rickert, who is chairman of the Kentucky Nature Preserves Commission, gave a report of the problems associated with the collection of funds related to the tax refund check-off law which supports non-game species programs in the state. Brainard Palmer-Ball, Jr. urged birders to send him reports of their Spring bird counts conducted on May 9th. Dr. Allaire announced the Saturday morning field trips and the Saturday program. A social hour with coffee, tea and cake was held after the meeting.

Two Saturday morning field trips were conducted, beginning at 7:45. A. L. Whitt and Bert Powell led one group on a 4-5 mile walking trip along paths from the lodge. Blaine Ferrell, Mrs. James Gillenwater, and Wayne Mason led a second group to the farm of Dr. and Mrs. Russell Starr. The weather was warm and sunny. At 2:30 p.m., Professor A. L. Whitt gave a slide and recorder presentation of common birds of Kentucky and their vocalizations. The Board of Directors met at 4:00 p.m. in the lodge.

The Saturday evening program was called to order by the president. Announcements were made concerning future K.O.S. meetings: Fall 1981 at Ken Lake State Park on October 2-4, Spring 1982 at Rough River on April 16-18, and Fall 1982 tentatively at Greenbo State Park the first weekend in October.

A recommendation from the Board read by the secretary stated that the K.O.S. go on record as expressing concern over the problems related to the Kentucky State tax refund check-off plan for support of the non-game species program and that we formulate a letter to send to the governor concerning same. Mr. A. L. Powell moved that we act on this recommendation, seconded by Dr. Burt Monroe. The motion carried.

Mr. Lee Nelson, chief of research and wildlife biologist for the Kentucky Department of Fish and Wildlife, spoke on Synthetic Fuel Production and its Effect on Birds and other Wildlife in Kentucky.

On Sunday morning, Dr. and Mrs. W. R. Kingsolver led a field trip along the Nature Trail near the lodge.

A total of 126 species was recorded during the three-day meeting.

Respectfully submitted,  
Virginia Kingsolver  
Recording Secretary

## BIRDS OBSERVED AT THE SPRING MEETING, 1981

Pied-billed Grebe, Green Heron, Great Egret, Mallard, Black Duck, Blue-winged Teal, Northern Shoveler, Wood Duck, Turkey Vulture, Black Vulture, Sharp-shinned Hawk, Cooper's Hawk, Red-tailed Hawk, Red-shouldered Hawk, Broad-winged Hawk, Marsh Hawk, Osprey, Merlin, American Kestrel, Bobwhite, Killdeer, Spotted Sandpiper, Solitary Sandpiper, Lesser Yellowlegs, White-rumped Sandpiper, Short-billed Dowitcher, Ring-billed Gull, Rock Dove, Mourning Dove, Yellow-billed Cuckoo, Black-billed Cuckoo, Barred Owl, Chuck-will's-widow, Whip-poor-will, Chimney Swift, Ruby-throated Hummingbird, Belted Kingfisher, Common Flicker, Pileated Woodpecker, Red-bellied Woodpecker, Red-headed Woodpecker, Yellow-bellied Sapsucker, Hairy Woodpecker, Downy Woodpecker, Eastern Kingbird, Great Crested Flycatcher, Eastern Phoebe, Acadian Flycatcher, Eastern Wood Pewee, Horned Lark, Tree Swallow, Bank Swallow, Rough-winged Swallow, Barn Swallow, Cliff Swallow, Purple Martin, Blue Jay, Common Crow, Carolina Chickadee, Tufted Titmouse, White-breasted Nuthatch, Red-breasted Nuthatch, House Wren, Carolina Wren, Mockingbird, Gray Catbird, Brown Thrasher, American Robin, Wood Thrush, Hermit Thrush, Eastern Bluebird, Blue-gray Gnatcatcher, Ruby-crowned Kinglet, Cedar Waxwing, Loggerhead Shrike, Starling, White-eyed Vireo, Yellow-throated Vireo, Red-eyed Vireo, Warbling Vireo, Black-and-white Warbler, Prothonotary Warbler, Swainson's Warbler, Worm-eating Warbler, Golden-winged Warbler, Blue-winged Warbler, Tennessee Warbler, Nashville Warbler, Yellow Warbler, Cape May Warbler, Yellow-rumped Warbler, Black-throated Green Warbler, Cerulean Warbler, Yellow-throated Warbler, Blackpoll Warbler, Prairie Warbler, Palm Warbler, Ovenbird, Northern Waterthrush, Louisiana Waterthrush, Kentucky Warbler, Common Yellowthroat, Yellow-breasted Chat, House Sparrow, Eastern Meadowlark, Red-winged Blackbird, Orchard Oriole, Northern Oriole, Common Grackle, Brown-headed Cowbird, Scarlet Tanager, Summer Tanager, Cardinal, Blue Grosbeak, Indigo Bunting, Purple Finch, American Goldfinch, Rufous-sided Towhee, Savannah Sparrow, Grasshopper Sparrow, Chipping Sparrow, Field Sparrow, White-crowned Sparrow, White-throated Sparrow, Swamp Sparrow, Song Sparrow, total 126 species.

## ATTENDANCE AT THE SPRING MEETING, 1981

BOWLING GREEN: Blaine Ferrell, Dr. and Mrs. Charles Guthrie, Mr. and Mrs. Mike Jones, Wayne Mason, Mr. and Mrs. William Mathes, Robert Oddo, H. E. Shadowen, Dan Twedt.

CARLISLE: Dr. and Mrs. Wendell Kingsolver.

ELIZABETHTOWN: Jon Rickert.

GLASGOW: Dr. and Mrs. Russell Starr.

JACKSON: Dr. and Mrs. Pierre Allaire.

LEXINGTON: Mr. and Mrs. Jim Williams.



LOUISVILLE: Brian Anderson, Mr. and Mrs. Paul Boyd, Mr. and Mrs. Wilbur Jackson, John Krull, Mrs. Charles Mudd, Brainard Palmer-Ball, Mr. and Mrs. F. W. Stamm, Burt Monroe, Jr., Mr. and Mrs. Donald Summerfield, Barbara Lensing.

MIDWAY: Glen Wells.

MOREHEAD: Fred Busroe.

OWENSBORO: Mr. and Mrs. Ramon Iles, Jeff Johnson, Bill Perkins, Mr. and Mrs. Bert Powell, Mr. and Mrs. L. E. Wilson.

RICHMOND: Mr. and Mrs. A. L. Whitt.

STANLEY: Mr. and Mrs. Thomas Stevenson.

DYERSBURG, TENNESSEE: Kenneth Leggett.

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## BOOK REVIEW

A FIELD GUIDE TO THE BIRDS, Fourth Edition, by Roger Tory Peterson, Houghton Mifflin Company, Boston, 1980; 384 pp. \$15.00 cloth, \$9.95 paper.

The long-awaited Fourth edition of A FIELD GUIDE TO THE BIRDS was recently placed on the market and was well worth waiting for. It is safe to state that most of the birders in North America today sharpened their identification skills with a Peterson field guide. The first edition was published in 1934; over two million copies have been sold. It has served as a model for other writers who have often patterned the format and technique of Peterson.

The Fourth edition is a definite improvement over his previous work. It contains 575 species, including accidentals and introduced species, found in the United States and Canada east of the one-hundredth meridian. There are 136 full-color plates along with concise descriptions and range maps. The artistry is superb, with arrows indicating the major features of identification. Species descriptions in this edition are located opposite the species illustrations—a desirable convenience factor. Range maps for each species, showing the breeding range, winter range, and the area where it is a permanent resident, are grouped near the end of the book.

In reviewing Peterson's Fourth edition I attempted to compare it with two other leading avian field guides, BIRDS OF NORTH AMERICA, by Robbins, Bruun, Zim, and Singer (340 pp.) and THE AUDUBON SOCIETY FIELD GUIDE TO NORTH AMERICAN BIRDS, Eastern Region, by Bull and Farrand (775 pp.). All three guides share some features—scientific and common name, species description, body length measurement, habitat description, voice description, and means of differentiation from similar species.

THE AUDUBON SOCIETY FIELD GUIDE includes the birds of eastern and central North America. The authors utilize a series of photographs arranged according to silhouette and coloration for assistance to the beginning birder. For example, the reader would turn to a series of silhouettes near the beginning of the guide and be directed from that point to the section of colored photographs; once the bird has been identified, the reader then turns to the species account which gives the description, voice, habitat, range, and nesting information. The nesting information is helpful and is not found in the other field guides. There are major disadvantages: the length of time involved in identifying a bird and finding the information concerning the species; and the fact that a single photograph simply can not match the illustrative value of several sketches, which also show sexual and age variations.

The BIRDS OF NORTH AMERICA, by Robbins, et al., includes birds throughout North America, and also has sonograms for most species. However, I have found these to be of little value except to those who have had musical training. Both Robbins and Peterson have included range maps; Robbins' range maps are located facing each species and thus immediately available; Peterson's range maps are larger and more precise but are grouped near the end of the book. Otherwise, the material is arranged in much the same way, and the artistry is excellent in both field guides. However, if one compares several plates the quality in the Peterson plates and their reproduction begin to emerge. For example, a comparison of the plates of the red finches in the two books reveals much better color reproduction in Peterson's work and a fuzzy indistinct quality of this plate in Robbins' work.

Most birders tend to continue to use a field guide once they have become accustomed to it. In an effort to eliminate this bias I asked friends to name three birds and then compare the illustrations and descriptions in the three guides being discussed in this review. It was concluded that the field guides by Peterson and Robbins, et al., were superior, and there was no appreciable difference between the two works. Finally I asked a non-birding friend to name a bird and then attempt to locate it and compare the information provided in the three field guides. Robbins' guide was slightly preferred because all the information, including the range map, was placed together in the book. The Audubon field guide was the most difficult to use.

Many years ago I began my birding with a Peterson field guide. Later I saw a copy of the field guide by Robbins, et al., and began using it because of its range maps and more convenient arrangement of materials. Now that Peterson has rearranged the material and included range maps I can detect almost no difference in these field guides from the standpoint of information and ease of use. The paper quality in Peterson's guide is superior, but the price is also considerably higher. I am requesting our University Book Store to stock both of these excellent field guides; the students will then have the opportunity to decide which field guide to purchase. — H. E. SHADOWEN, Dept. of Biology, Western Kentucky University, Bowling Green, 42101.



## NEWS AND VIEWS

### NEST-CARD PROGRAM

KOS members, in their seventeenth year of participation and cooperation with Cornell University's North American Nest-Record Card Program, have done well. As a result of this study, a substantial body of information is being accumulated on the breeding of many Kentucky birds for which relatively few precise data were formerly available. An in-depth report of KOS findings will soon be published. Record cards for the 1981 season may be obtained from any of the Kentucky regional chairmen: Fred Busroe, UPO 1352, Morehead State University, Morehead, Kentucky 40351; A. L. Whitt, Jr., Biology Department, Eastern Kentucky University, Richmond, Kentucky 40475; Wayne Mason, 1358 College Street, Bowling Green, Kentucky 42101; Anne L. Stamm, 9101 Spokane Way, Louisville, Kentucky 40222.

We ask that each observer make out duplicate cards on the forms provided, insuring that the information record on the two sets is identical in all respects; both the original, *in pencil*, and the copy should be sent to the person from whom you received the cards, or to Anne L. Stamm, or bring them to the Fall Meeting at Ken Lake, October 2-4.

### FALL MEETING, 1981

The Fall Meeting of the Kentucky Ornithological Society is scheduled for Ken Lake State Park October 2-4. Due to the popularity of our park system, and particularly Ken Lake, each member is urged to make reservations immediately.

### STATEMENT OF EDITORIAL POLICY

Increasing costs of publication have forced changes in publication policies for The Kentucky Warbler. Emphasis will continue to be placed on research and conservation of avian species in Kentucky. Research conducted in other states or by non-K.O.S. members will not be published unless the work has unusual merit or significance. Manuscripts should be typed and double-spaced. Photographs should be on black and white glossy paper 5x7 or 8x10 inches in size. Members are encouraged to become more actively involved in reporting field observations for inclusion in the seasonal reports.